Cryptosporidium Sampling System

Required for Compliance With Long Term 2 (LT2) Monitoring

Georgia EPD Laboratory

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Long Term 2 Summary

- The purpose of monitoring associated with this rule is to reduce disease incidence associated with Cryptosporidium and other microorganisms.
- Requires surface water systems and ground water systems under the influence to monitor for cryptosporidium and *E.* Coli.
- Frequency and duration – monthly for 24 months.
- Results will be used to classify the PWS into a treatment “bin”.
- Treatment bin will be used to determine if additional water treatment is necessary.

Sample Collection and Delivery to EPD Laboratory

- Sample collection requires a “sample collection system” similar to that required by the ICR.
- The EPD Laboratory will be sending an IDEXX brand filter to water systems.
- Water systems are required to obtain the parts and construct the required system using the IDEXX filter housing.
- The EPD laboratory will provide an ice chest containing a sample collection filter and *E.* Coli collection bottle.
- Samples must be returned to the EPD laboratory on ice.

Sampling Location and Requirements

- This sampling system is designed to take a sample from a pressurized **raw water** faucet.
- Other nonpressurized systems are available, but are not very efficient due to insufficient pressure to push the water through the filter.
- Pressure and flow through the collection system must be controlled.

Presentation Format

- First, a slide with a complete picture of the system along with a item number for each part of the apparatus is shown.
- Second, a breakdown of each item with the vendor, telephone number, number of parts and part number is presented in the following format:
  - ***Part Identification and number of parts required***
    - ***Vendor***
    - ***Phone number***
    - ***Part Number***
- Third, a slide with a description of assembly and additional information.
- Forth, assembly of the individual components into a complete sampling system.

Sample Collection System Parts

1- Hose and clamps

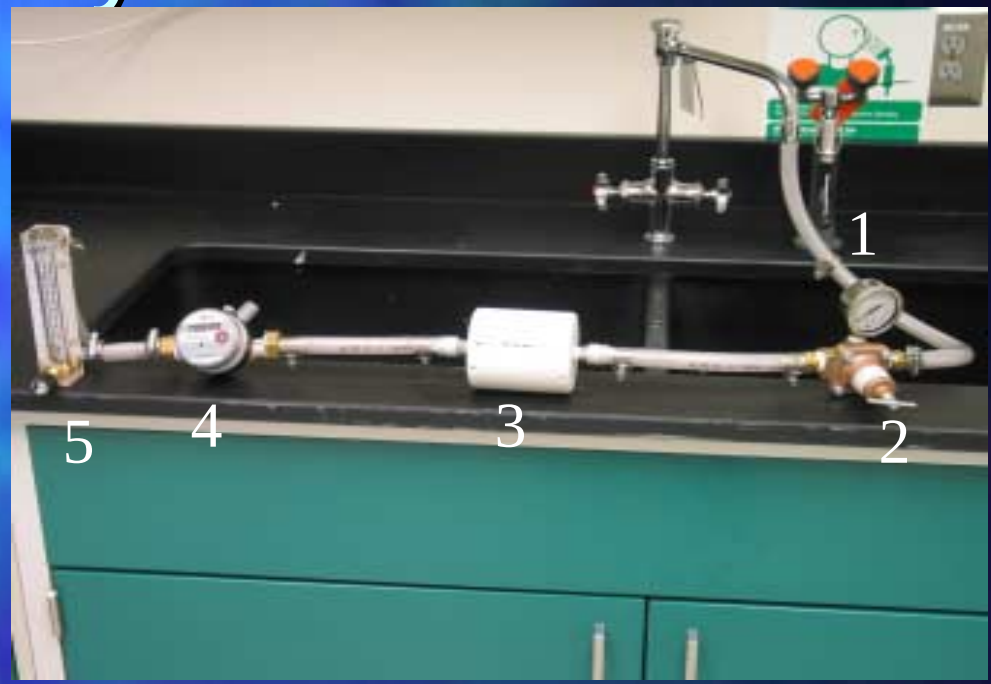
2- Pressure control valve and gauge

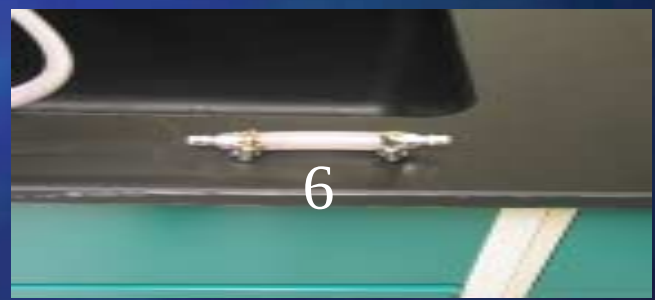
3- IDEXX filter housing

4- Flow totalizer

5- Flow Meter with Valve

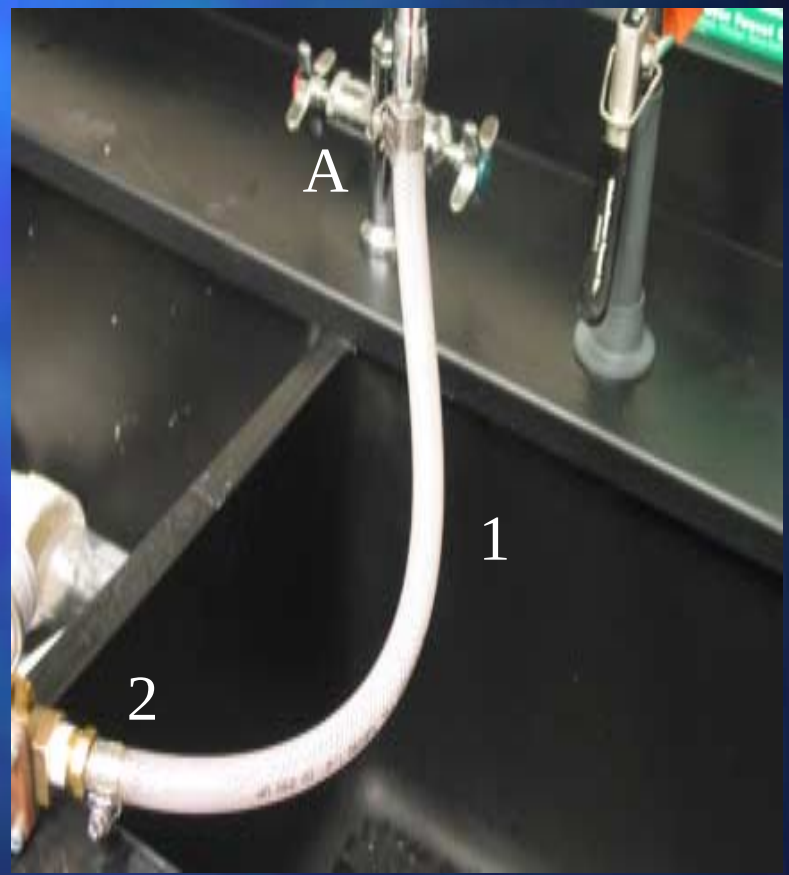
6- Pressure and flow adjustment insert- used in place of 3 during adjustment.





Hose and Clamps, Part No. 1

- Hose Repair Swivel (not shown) to connect to a raw water faucet, 1 required. (at location A)
  - Ace Hardware
  - Local Store
  - *P/N* 72700
- 1- Hose
  - Ace Hardware
  - Local Store
  - ½ inch ID by ¾ inch OD reinforced, flexible- 6-8 feet required
- 2- Clamps ½ inch wide x min opening 3/8 inch by max opening 7/8 inch, 11 required
  - Granger
  - 1-800-403-4255
  - *P/N* 5X443



Hose and Clamps, Part No. 1- Assembly

- Reinforced hose is recommended because of system pressure.
- In the previous picture the hose is connected to a laboratory faucet. For plant raw water sample collection use a Ace Hardware Hose repair swivel, part no. 72700.

Pressure Regulator Valve and Gauge, Part No. 2

- Required to control pressure through IDEXX sample filter.
- Pressure through the apparatus can not exceed 120 psi during sample collection.

Pressure Regulator Valve and Gauge, Part No. 2

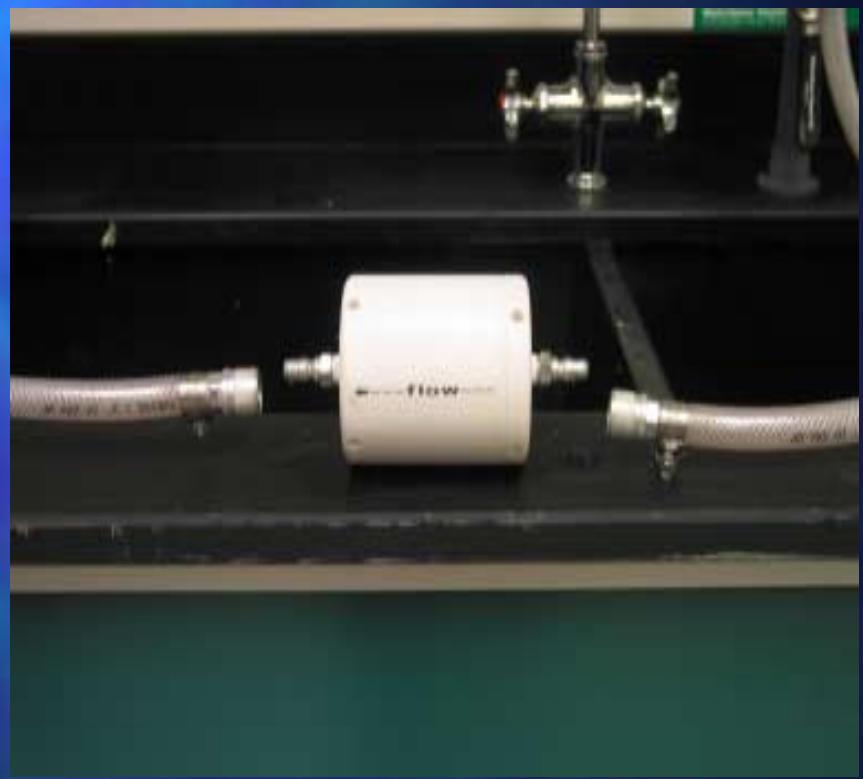
- 1- Hose coupler, male- (½NPT x ½HB Barbed), 2 required
  - Ace hardware
  - Local Store
  - *P/N* 46965 AB201A-8D
- 2- Gauge, liquid filled, 0-160psi, ¼NPT, 1 required
  - Granger
  - 1-800-403-4255
  - *P/N* 5HK59
- 3- Valve, water pressure regulator, 0-75psi range, 1 required
  - Granger
  - 1-800- 403-4255
  - *P/N* 2A645

Pressure Regulator Valve and Gauge, Part No. 2- Assembly

- 1- Hose coupler, male- 2 required (½NPT x ½HB Barbed are used to attach the hose to the pressure regulator.
- 2- Gauge, liquid filled, 0-160psi, ¼NPT is attached directly to the pressure regulator after the ¼ inch plug is removed from the regulator.
- Teflon tape is wrapped on the threads of all fitting to ensure a leak free connection.
- Release locking nut on adjustment T handle to change pressure.
- Leakage becomes more of a problem as pressure increases.

Idexx Filter Housing, Part No. 3

- Filter housing required to hold IDEXX filter. Not provided by EPD laboratory.
- IDEXX filter used to collect sample will be provided by EPD laboratory.



Idexx Filter Housing, Part No. 3

- 1- Swagelok Quick Connect, Female(optional), 2 required
  - Georgia Valve and Fitting
  - 678-624-0949
  - *P/N* B-QF4-B-4PM
- 2- Swagelok Quick Connect, Male(optional), 2 required for housing & 2 for bypass hose Part No. 6
  - Georgia Valve and Fitting
  - 678-624-0949
  - *P/N* B-QF4-S-4PM
- 3- IDEXX Filter Housing
  - IDEXX
  - 1-800-321-0207
  - *P/N* FMC 10504- w/ fittings
- Filter housing tool (not shown)
  - IDEXX
  - 1-800- 321-0207
  - Use Description- Green Handle, 2 required. *P/N* FMC 10506

Idexx Filter Housing, Part No. 3- Assembly

- If Quick Connects are used, remove the fittings provided with the housing and wrap threads on Part No. 1 previous slide, with sufficient Teflon tape to ensure a leak free connection to hose.
- ***Caution:*** When inserting fittings, Part No 2 previous slide, into filter housing, Part No. 3 previous slide, take extreme care to not cross thread or over tighten.
- The fittings provided with the housing may be attached directly to the hose with hose clamps.

Flow Totalizer Meter, Part No. 4

- Required to measure 10 liters of water passed through the filter.
- Totalizer recommended, measures in liters.
- A totalizer meter that measures in gallons may be used. Required volume would be 2.64 gallons.

Flow Totalizer Meter, Part No. 4

- 1- Hose repair swivel assembly- 2 required
  - Ace Hardware
  - Local Store
  - *P/N* 72700
- 2- Attachment nut and washer included w/ totalizer- 2 required
  - Omega Engineering
  - 1-800-622-2378
  - Included w/ totalizer
- 3- Turbine meter for totalization- 1 required
  - Omega Engineering
  - 1-800-622-2378
  - *P/N* FTB4005A-Metric

Flow Totalizer, Part No. 4- Assembly

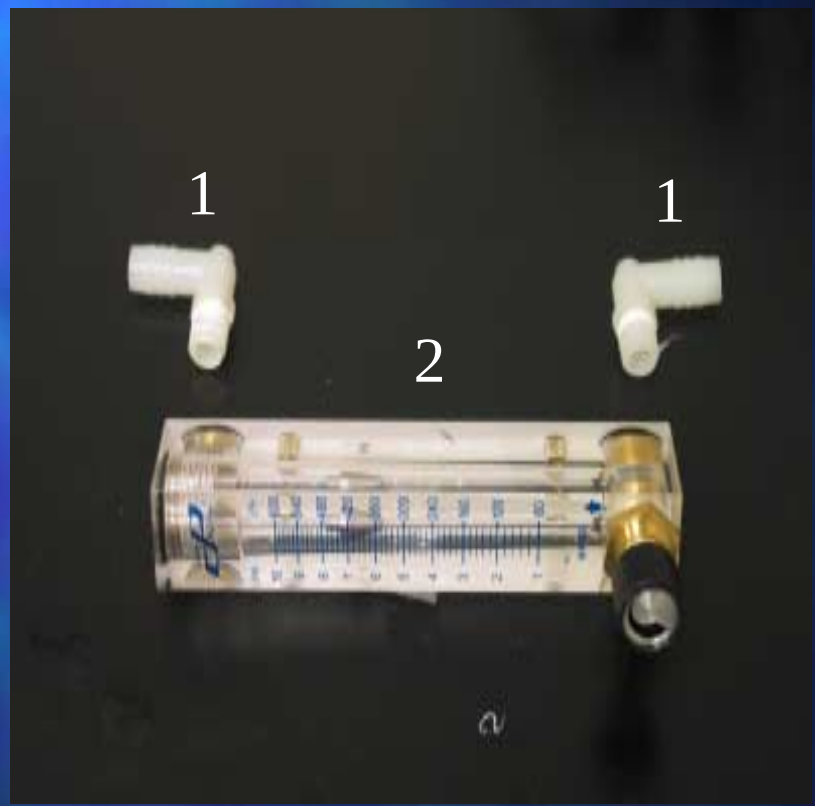
- Do not use connections included with totalizer.
- Use hose connections, part no. 72700, to attach hose to totalizer. Remove washer, remove barbed hose fitting, insert barbed hose fitting in nut included with totalizer and use washer included with totalizer. Install on totalizer entrance and exit ends. See previous slide.
- Washer on connections are included with the totalizer.

Flow Meter With Valve, Part No. 5

- Required to ensure that flow does not exceed 4 LPM during sample collection.

Flow Meter With Valve, Part No. 5

- 1- Barbed Fitting Elbow, 2 required
  - Cole Palmer
  - 1-800-323-4340
  - *P/N* A-06478-11, nylon ¼ inch, barbed end for ½ inch hose
- 2- Flow Meter w/ Valve
  - Cole Palmer
  - 1-800-323-4340
  - *P/N* A-32461-44



Flow Meter With Valve, Part No. 5- Assembly

- Wrap elbow fitting threads with Teflon tape to prevent leaks.

Pressure and Flow Adjustment Insert, Part No. 6

- Inserted in the sampling system to make system adjustments prior to placing the actual sample collection filter in the filter housing during sample collection.

Pressure and Flow Adjustment Insert, Part No. 6

- 1- Swagelok Quick Connect, Male(optional), 2 required for bypass hose Part No. 6
  - Georgia Valve and Fitting
  - 678-624-0949
  - *P/N* B-QF4-S-4PM
- 2- 6 inches of ½ inch ID by ¾ OD reinforced, flexible. See Part No. 1 slide.
  - Ace Hardware
  - Local Store

Note: A 6 inch piece of ½ inch OD PVC may be substituted for Part No. 6 if Quick Connects are not used.

Pressure and Flow Adjustment Insert, Part No. 6- Assembly

- Use 6 inches of reinforced hose from Part No. 1 slide.
- Wrap threads on quick connects with sufficient Teflon tape to prevent leaks.

Final Assembly, Slide 1

After assembly of individual components in previous slides

- Attach Hose Repair Swivel to sufficient hose (1) to reach a pressurized raw water faucet.
- Attach pressure regulator valve assembly (2) hose. See the back of the valve to ensure connection of this section of hose to the “inlet” side.
- Connect a second length of hose to the “outlet” side of the valve.
- Connect the other end of the the hose to the female Quick Connect if Quick Connect are to be used. If not place a hose clamp on the hose for connection directly to the IDEXX filter housing.
- If Quick connects are used, carefully insert the male Quick connect fitting into the inlet side of the filter housing.

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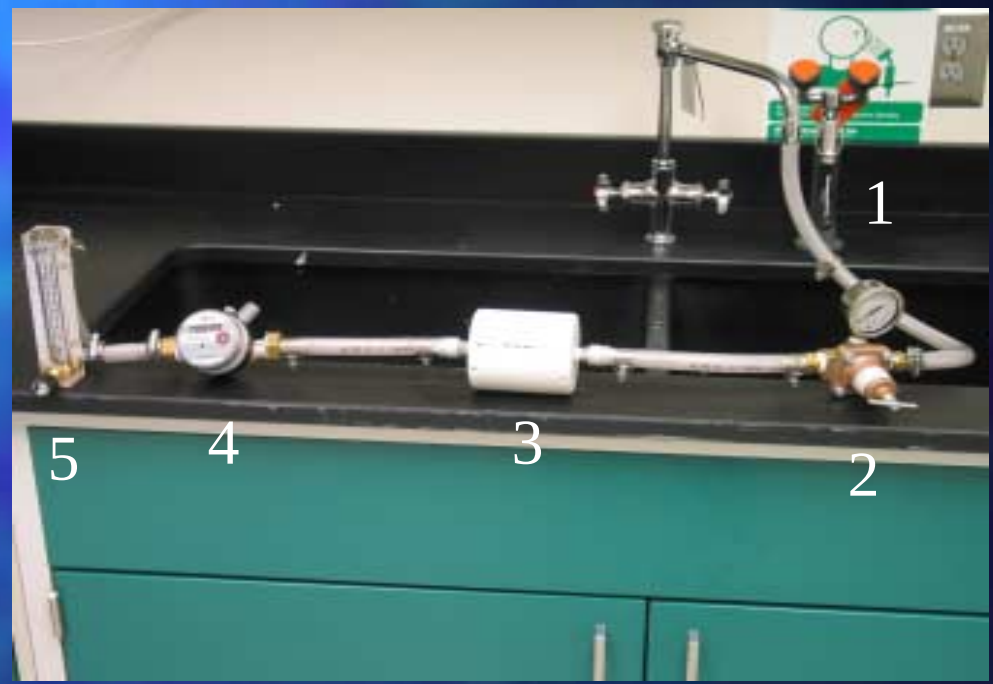

Final Assembly, Slide 2

After assembly of individual components in previous slides

- Ensure water flow direction is from the outlet side of the regulator valve into the inlet side of the filter housing (3).
- If Quick connects are used, carefully insert the male Quick Connect into the outlet side of the filter.
- If Quick Connects are used attach the female end of the Quick Connect to another section of hose.
- If Quick Connects are not used, the filter housing should be ordered with hose connection fittings. A short section of ½ inch outside diameter PVC will be required to use as a filter housing bypass during system adjustment.

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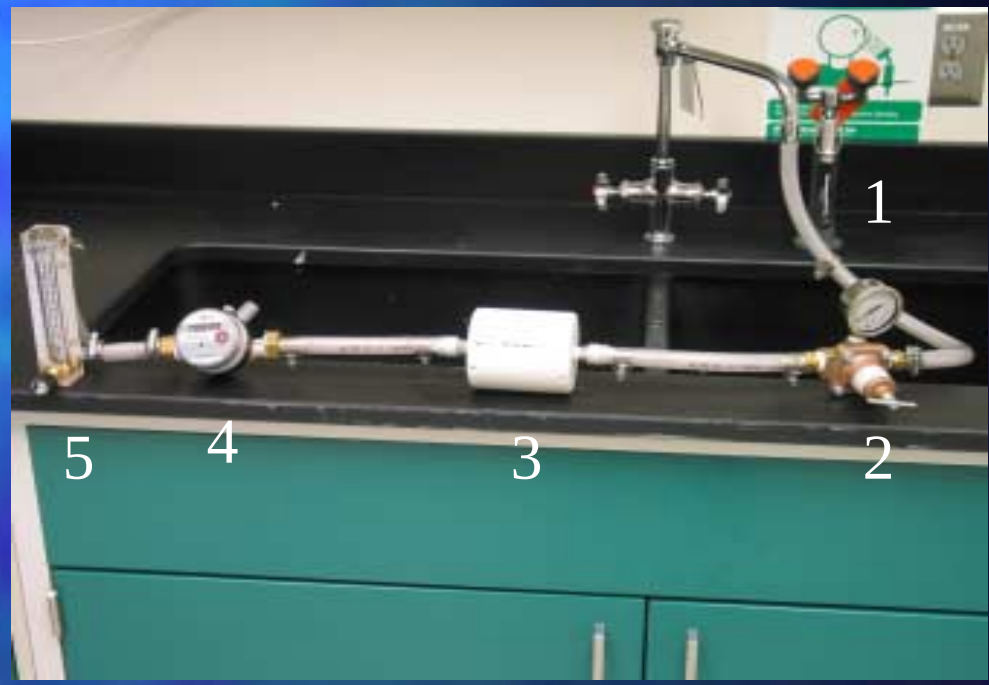

Final Assembly, Slide 3

After assembly of individual components in previous slides

- Connect the other end of this section of hose to the inlet side of the flow totalizer meter (4), see direction of flow arrow on meter.
- Connect a short section of hose to the outlet side of the flow totalizer meter
- This hose should connect to the bottom of the flow meter. Before tightening the clamps, ensure the meter stands up straight. The flow meter must be vertical for accurate measurement of flow through the apparatus.
- Connect sufficient hose to the outlet on the flow meter to discharge sampled raw water.
- Connect system to a faucet for testing

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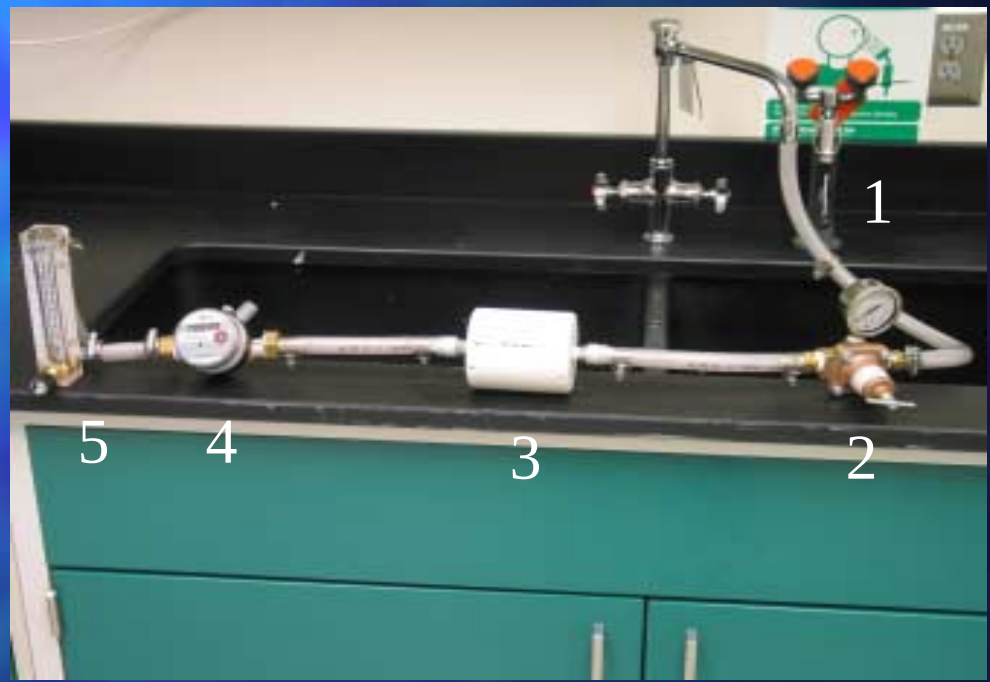
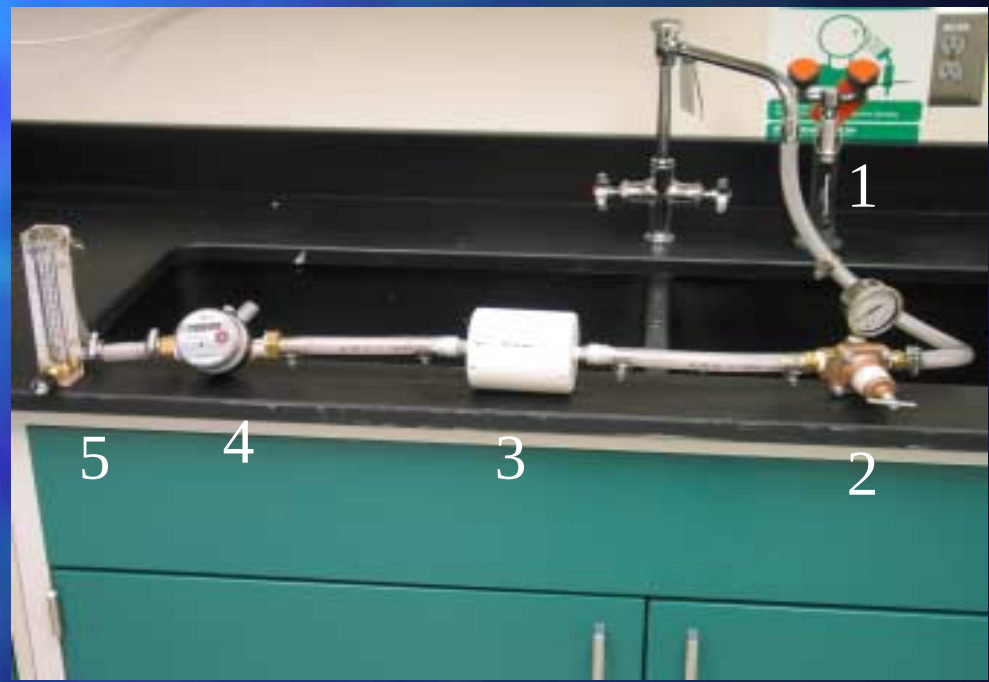


Final Assembly, Slide 4

After assembly of individual components in previous slides

- To check for leaks the filter housing should be placed in the apparatus.
- Back the pressure regulator valve (2) out by turning counter clockwise.
- Slowly turn on water and begin increasing pressure on the system with the pressure regulator valve by turning the valve clockwise until 20psi is reached. Remove air from system by holding flow controller end of apparatus elevated.
- Adjust the flow control valve (5) to approximately 4 LPM.
- Check system for leaks. Carefully tighten connections or clamps where necessary to stop leaks.
- Once apparatus is leak proofed it is ready for sample collection.
- See Sample Collection Presentation for sample collection.



Contact Phone Number

- EPD Drinking Water Program
  - 404-656-2750

Acknowledgements

Thanks go out to the following EPD Laboratory Staff members for donating their time and effort to this project. Including research into sample collection, the system assembly, and photography used in this presentation.

- Myrna- research
- Bob- assembly
- Ray- photography

LT2 Cryptosporidium Sample Collection System
Parts List

Assembly Part No.*	Description	Part Number	Supplier(s)	Approximate Cost	Remarks
1	Faucet Attachment	27200	Ace Hardware Local Store	$4.00	Hose Repair Swivel, 1 required
1.1	Hose	½ inch ID x ¾ OD reinforced, flexible	Ace Hardware Local Store	Priced by the foot	Hose used throughout the system, 6-8 ft.
1.2	Hose Clamps	5X443	Granger 1-800-403-4255	$12.00 for 10	½ inch x □ min. x □ max opening, 11 required
2.1	Hose Coupler, Male	46965 AB201A-8D	Ace Hardware Local Store	$2.25	2 required
2.2	Gauge, Liquid Filled	5HK59	Granger 1-800-403-4255	$7.00	Range 0-160 psi. Pipe size NPT ¼ inch
2.3	Valve Water Pressure Regulator	2A645	Granger 1-800-403-4255	$32.00	Adjustable from 10 to 75 psi.
3.1	Quick Connect (optional)	B-QF4-B-4PM	Swagelock, Georgia Valve & Fitting 678-624-0949	$11.00	Female, 2 required
3.2	Quick Connect (optional)	B-QF4-S-4PM	Swagelock, Georgia Valve & Fitting 678-624-0949	$6.00	Male, 2 required
3.3	Filter Housing	FMC 10504	IDEXX 1-800-321-0207	$180	Required to hold EPD Lab provided filter.
Not shown in presentation	Filter Housing Tools	Green Handle, FMC 10506	IDEXX 1-800-321-0207	$8.00	Required to open and close filter housing
4.1	Hose Repair Swivel	72700	Ace Hardware Local Store	$4.00	2 required to adapt to hose couple to totalizer
4.2	Nut and Washer	Included w/ Totalizer	Omega.com	Included	Adapted from connector included w/ totalizer
4.3	Turbine Meter Flow Totalizer	FTB4005A-Metric	Omega.com	$105.00	Required to measure 10 Liters sample volume
5.1	(11) Elbow Fittings for Inlet & Exit ends of Flow Meter	A-06478-11	Cole Palmer 1-800-323-4340	$11.00 for pkg of 10	Connect hose to flow meter, 2 required
5.2	Flow Meter with valve	A-32461-44	Cole Palmer 1-800-323-4340	$75.00	Required to set flow through system not to exceed 4LPM
6.1	Quick Connect (optional)	B-QF4-B-4PM	Swagelock, Georgia Valve & Fitting 678-624-0949	$6.00	Female, 2 required
6.2	Hose	½ inch ID x ¾ OD reinforced, flexible	Ace Hardware Local Store	Priced by the foot	6 inch section required

* Assembly No. Followed by Item No.
Estimated Cost for Filtration Apparatus = $500.00

Sample Collection With the Cryptosporidium Sampling System and *E.* Coli Sample Collection

Required for Compliance With Long Term 2 (LT2) Monitoring

Georgia EPD Laboratory

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Long Term 2 Summary

- The purpose of monitoring associated with this rule is to reduce disease incidence associated with Cryptosporidium and other microorganisms.
- Requires surface water systems and ground water systems under the influence to monitor for cryptosporidium and *E.* Coli.
- Frequency and duration – monthly for 24 months.
- Results will be used to classify the PWS into a treatment “bin”.
- Treatment bin will be used to determine if additional water treatment is necessary.

Cryptosporidium Sample Collection

- Samples are collected using a sample collection system as shown on right.
- This sample collection system must be obtained by the water system.
- The EPD laboratory will not provide the sample collection system.

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Cryptosporidium Sample Collection

- A sample collection kit will be provided by the EPD laboratory.
- The IDEXX filter, included with the kit, is designed to fit in the filter housing of the sample collection system.

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Cryptosporidium Sample Collection

- 1- sample collection filter in packaging
- 2- *E.* Coli sample collection bottle
- 3- Plastic bag to place filter in.
- 4- Sample documentation

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Cryptosporidium Sample Collection

- Connect the sample collection to a pressurized **raw water** faucet.
- This system is connected to a lab faucet for demonstration only.

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Cryptosporidium Sample Collection

- Place filter bypass (part no. 6) in the sample system.
- Do not place the collection filter in the system until pressure and flow are adjusted!
- A short piece of ½ OD PVC can be used in place of part no. 6 if Quick Connects are not used.

Cryptosporidium Sample Collection

- Turn off all flow through system by turning T handle on pressure regulator counter clockwise.
- Slowly turn on raw water faucet.
- Adjust pressure by turning T handle on clock wise. Set initial pressure between 50 and 75 psi.
- Pressure may be increased to 120 psi if necessary for turbid samples.

Cryptosporidium Sample Collection

- Adjust flow through system to 4 LPM.
- After setting flow use the raw water faucet control to zero the meter. Stop flow.
- Record meter “start” reading under Total Volume Filtered on Protozoan Lab Sample Form, included in kit.

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Cryptosporidium Sample Collection

- Remove end cover from IDEXX filter housing and lay face up on clean paper towel.
- Open filter bag and remove filter carefully by the threaded screw.

Cryptosporidium Sample Collection

- Place filter in housing, threaded screw up.
- Place inlet end of housing on and tighten.
- Use filter housing tool, *P/N* FMC 10506, to tighten housing.

Cryptosporidium Sample Collection

- Insert housing in line in the system.
- Ensure flow is in correct direction.
- Slowly turn on raw water faucet.
- Raise outlet side of system to remove as much air as possible.

Cryptosporidium Sample Collection

- Collect sample by running 10 liters (2.64 gal.) of raw water through collection filter.
- Flow through system can not exceed 4 LPM as measured on flow meter. Control flow with pressure regulator by reducing pressure to ensure less than 4 LPM flow.
- Monitor volume through system by closely watching totalizer.

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Cryptosporidium Sample Collection

- Stop flow through system when a total of 10 liters (2.64 gal.) of raw water has passed.
- Record “End” meter reading under Total Volume Filtered on Protozoan Lab Sample Form.

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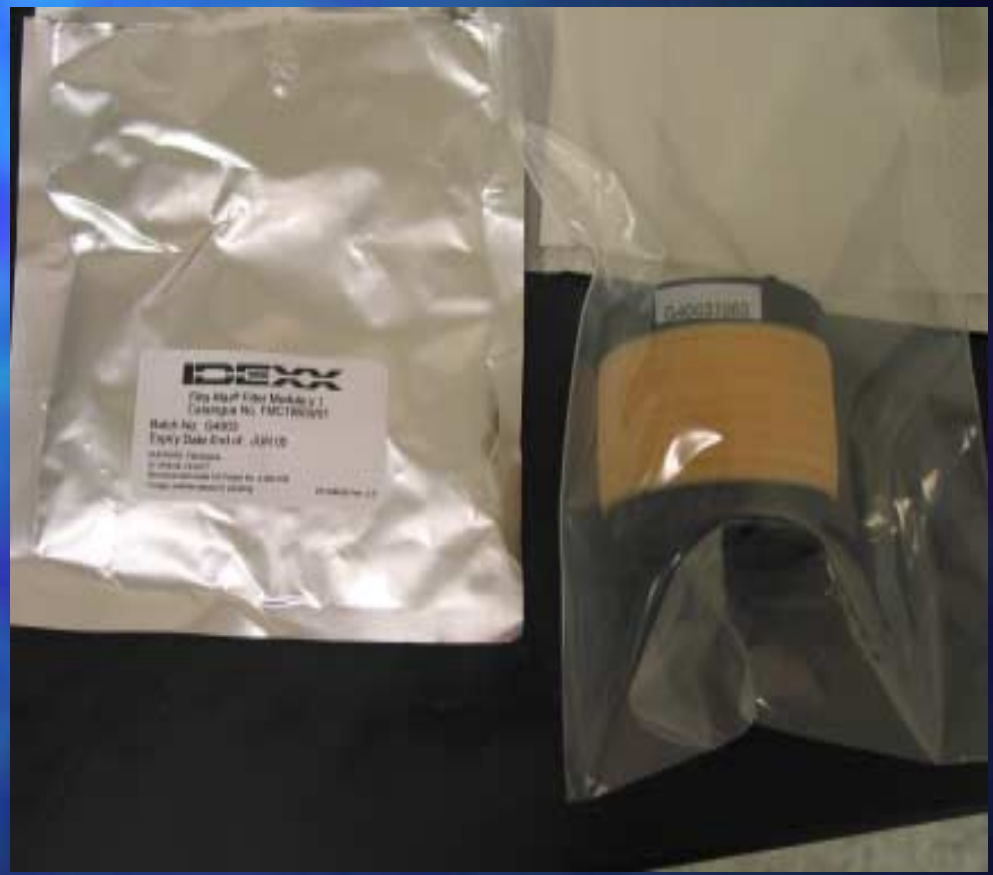
Cryptosporidium Sample Collection

- Remove the filter by holding the threaded screw and place in the plastic bag include with the sampling kit.

Cryptosporidium Sample Collection

- Record the Lot Number from the original filter bag and the filter number from the filter on the sample documentation.



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E. Coli Sample Collection

- Use the bottle pictured at left and included in sampling kit to collect the *E.* Coli sample.
- Open the container and allow the raw water tap to flow for 3 minutes.
- Slowly fill the bottle and recap.
- See instructions included in sampling kit for additional information.

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Sample Packaging and Shipping

- After the *E.* Coli sample has been collected (follow directions included with kit) and the bottle placed in a plastic bag, place both sample in the larger plastic bag and add ice. The sample must be received at 0-8°C.
- Fill out all sample documentation and place in another plastic bag.
- Send cooler overnight to the EPD Laboratory.

Sample Collection Kits

- The sampling kit pictured above will be received for 23 of the 24 month sampling period.
- The bottom kit will be received once during the sampling period for collection of the method required matrix spike.
- 10 liters of water will be collected in the collapsible container along with the IDEXX filter sample. The *E.* Coli sample will be collected in the usual bottle.

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Contact Phone Number

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  - 404-656-2750

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